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CONTENTS

Textile Museum — 50th Anniversary 4

ARTICLES

The Technical Features of a Middle Horizon Tapestry Shirt from Peru 5
Junius B. Bird and Milica Dimitrijevic Skinner

Felt-making Craftsmen of the Anatolian and Iranian Plateaux 14
Michael and Veronika Gervers

Is the Mamluk Carpet a Mandala? 30
A Speculation
Charles Grant Ellis

Dress and Design in Highland Southeast Asia: The Hmong (Miao) and the Yao 51
Monni Adams

A Group of Silk Islamic Banners 67
Walter B. Denny

An Oriental Rug of A. D. 1280 82
Ellen Johnston Laing

Book Review 85
Anthony N. Landreau

Books Briefly Noted 87

Board of Trustees, Advisory Council, and Staff. 88

Cover: Color photograph of interlocked tapestry-woven poncho-shirt, Middle Horizon, Huari-Tiahuanaco style. Alfred C. Glassell, Jr. Collection, Houston, Texas. Color plate courtesy of Mr. Glassell.

The views expressed by the authors are their own; they do not necessarily reflect those of the Textile Museum.

The Technical Features of a Middle Horizon Tapestry Shirt From Peru

Junius B. Bird and
Milica Dimitrijevic Skinner

CONSERVATION WORK on an unusually well preserved Middle Horizon tapestry shirt, Fig. 1, from the Alfred C. Glassell, Jr. Collection was done in 1969 by Mrs. Milica Dimitrijevic Skinner. The progress of the work provided an ideal time for detailed examination and for speculation on how the original weaving had been accomplished. As no adequate study of the technical features of such shirts has been published, this is offered in the hope that it may induce others to note and record the type of details mentioned here. Ultimately, when more data is compiled on the other available examples, especially the fine series in the Textile Museum collection, we can anticipate significant deductions on the relationship of style, techniques and other features. These cannot be derived from a single example so our notes are of necessity only descriptive and a record of measurable and specific features.

Shirts of this period and pattern can be described as untailored sacks or ponchos seamed down the sides with openings left for the arms and neck. Since the material has a certain stiffness, it does not drape freely. Such a garment, if undecorated, does little or nothing for the human figure except hide it. The dimensions of the finished shirt, approximately 41 inches square (104 cm.) are such that on a man five feet, seven inches tall (170 cm.) with an arm span of 66 inches (167.5 cm.), the bottom edge hangs just at the lower margin of the kneecaps and the arm openings reach and almost cover the elbows.

The circumference of the neck opening, 33 inches (84cm.), poses no problem for the average head. The arm openings, with circumferences of 12.5 and 13 inches (32 and 33 cm.), are another matter and would be too snug to be worn over the elbows of most men with muscular arms.

The shirt was probably worn with a loin cloth which would have been completely hidden. As far as we know, there was no other undergarment. Within the range of the climatic variations found on the Peruvian coast and in the higher interior, this type of shirt was an adequate, comfortable, protective garment.

The fact that this specimen is so beautifully made, so colorful and of such fine quality suggests that it belonged to someone of important rank. It had been worn enough so the neck area was dirty, stained and creased to a degree implying ordinary day-to-day wear rather than just occasional official or ceremonial use. Other evidence of wear or, more probably, strain is found at the arm openings where the cut ends of the warp yarns in small sections of the finished edge have pulled loose. One cut or torn hole in the patterned tapestry near the bottom edge has been skillfully rewoven. The hole definitely was not the result of wear for the adjacent material is in perfect condition. Was it an accident or was the wearer struck by some weapon? In either case the damage was repaired and the shirt appears to have been worn subsequently.

Down the central area on both sides of the shirt were a number of spots or stains of varied sizes and irregular distribution. Their appearance was similar to the marks left by a spilled liquid which wets the surface without really saturating the fabric. While all were certainly ancient there is a question — did they result from careless eating or drinking or from some burial ritual? Some Peruvian and North Chilean mummy bundles have spattered marks on their outer wrappings where a liquid was sprinkled over them before the tombs were closed. This may have been corn beer or toasted corn flour and water; at least it had more substance to it than the holy water used by some in current burial ritual. The shirt, however, is in such good condition that it could not have been used as an outer cover for the mummy and we only can conclude that we are dealing with accidental soiling while the shirt was being worn. If so, it was worn with either side forward and no distinction was made as to front and back. During cleaning most of the spots proved to be water soluble and were removed. Others could not be eliminated and are still visible. Evidently they were not all caused by the same substance.

Beyond what we can infer from the shirt, we have no information as to the individual who owned it. His tomb was rifled by professional treasure hunters so there is no record of the other fabrics and garments found with him. There must have been a number of ceramic vessels, perhaps other objects and just possibly something made of gold. Whatever there was of saleable nature has been dispersed long since. We do not know even when the grave was found nor where it was located.

A large section of coastal Peru was at one time under the control of people culturally related to or identical with those who occupied the site of the Huari ruins in the highlands near Ayacucho, at about 13° south latitude. In their art and iconography they shared much in common with the culture centered at the better-known ruins of Tiahuanaco. For this reason, shirts like this one and related artifacts were, and still are, designated as of the Tiahuanaco culture.

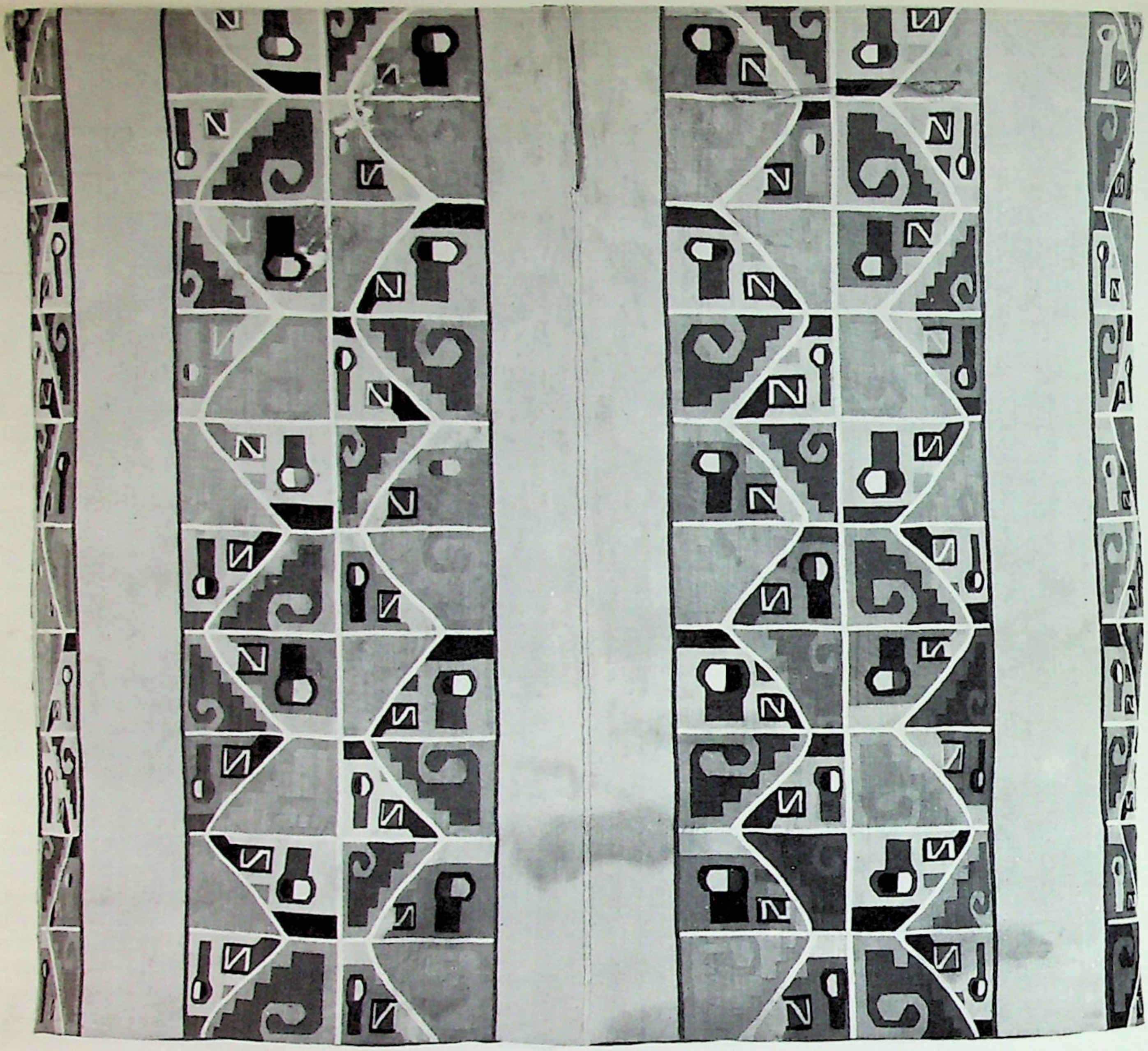
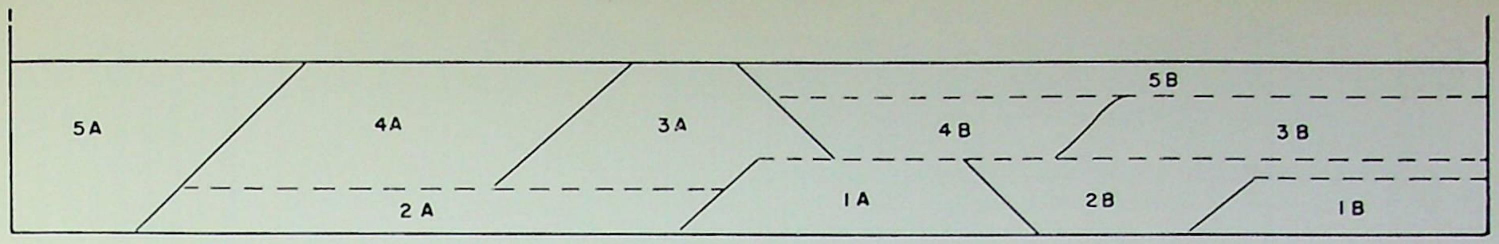


Fig. 1 A man's poncho-shirt of interlocked tapestry woven in two separate fabrics and seamed down center and sides. Middle Horizon, Huari-Tiahuanaco style. Alfred C. Glassell, Jr. Collection, Houston, Texas.

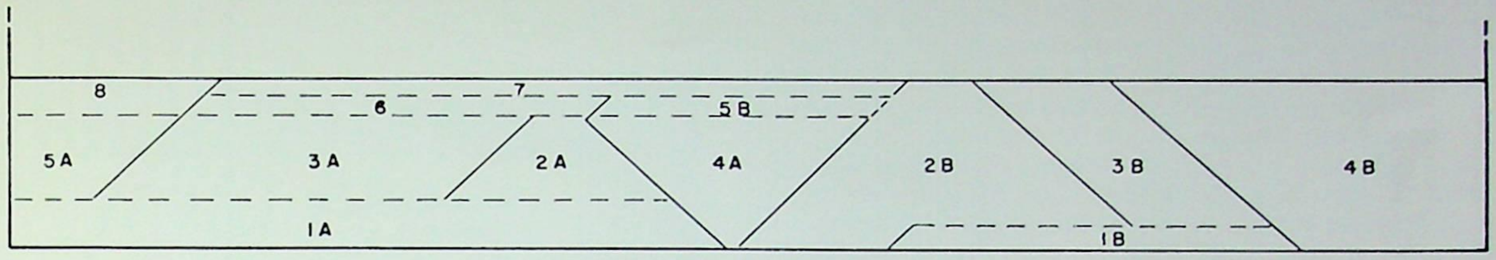
As yet, radio carbon dating of the Huari phases or epochs forming the Middle Horizon has not been fully worked out. The inference at the present time is that the Middle Horizon falls between 800 and 1100 A.D. Where the Glassell shirt fits within this period remains to be seen.

Both sides of the shirt are almost identical, differing only in small details of color distribution. It is virtually square, and is formed of two separately woven fabrics seamed down the center; width 41.7 inches (106 cm.), length 41.5 inches (105.4 cm.). Measurements vary slightly depending on where they are made. In each section the warps run horizontally so the average loom width of the cloth is twice the shirt length, i.e. about 83 inches (211 cm.). The construction is tapestry with the wefts interlocked between the warps where the colors in the pattern meet squarely along the line of the warp. Where the color juncture slants, the wefts simply turn about adjacent warps without interlocking. In general, the wefts cross the warps at right angles. The most notable exceptions occur in the white diagonal lines where the wefts slant and in some places run lengthwise with the diagonal.

The tapestry is identical in appearance on both faces. From what we have seen of unfinished tapestry on archaeological looms from Peru, and from modern practice, most of the ends of the weft yarns used in the different parts of the design are left hanging on the surface facing the weaver. If they are to be cut off, this is done after weaving is completed. In this case, the finishing has been done so carefully that it is



Fabric 1



Fabric 2

Fig. 2 Diagrams of the monochrome sections next to the central seam in the shirt. Here both are separated, oriented with the warp end selvages at the bottom. No wefts extended the full loom width. Instead they travel back and forth within specific areas delineated by traceable diagonal junctures. The numerals indicate the sequence of construction with work starting at the warp end selvages. The letters indicate those areas which could have been woven simultaneously by two weavers. For example, in fabric 1, area 2B could not have been woven until 1A and 1B were completed. 2A and 2B could have been woven at the same time, but 3A and 3B could not have been started until the 2's were finished.

impossible, without magnification, to find the weft ends. As might be expected, they are at the inner surface of the shirt.

In the monochrome stripes, between the patterned areas, the golden-tan wefts do not run from side selvage to side selvage. Instead they turn at irregular intervals forming barely perceptible, diagonal juncture lines. Where they turn, the wefts do not interlock but simply reverse direction between adjacent warps and are staggered by shifting one warp to the left or right with each passage. One finds this feature in tapestry from various parts of the world and it is done by some weavers today. The only explanation they offer is that one can work without opening the shed the full width of the fabric. To check this, we plotted all the slanted junctures in the four plain sections, finding fourteen in one fabric and eighteen in the other. They vary greatly in length and relative location and are irregularly distributed without any common characteristics of size or location, as shown in the diagram of two examples, Fig. 2. The longest section where the weft passes without turning back in the following shed is about 37 inches, (94 cm.) long. The shortest less than an inch (2.5 cm.). Because of the overlapping one can determine the sequence in which they were created, and this in turn provides almost conclusive proof that two weavers were at work. Each was independent of the other until the final completion or filling of the band and, as the quality of the work is equal, they were both equally experienced and skilled.

While recording data on the shirt, we referred to the side shown in Fig. 1 as side A; the fabric forming the left half of this side as fabric 1, and that at the right as fabric 2. Both have the same type yarns and both, with one exception, have the same colors. The wefts are all of wool, presumably either alpaca or llama and are all two-ply, spun Z and doubled S. The average weft counts per inch are: fabric 1, 99.6; fabric 2, 105.

The warp, also two-ply with the same spin and doubling twists as the weft, is in part wool, in part cotton. The wool and cotton are distributed as shown in Fig. 3. At one place there are at least six warps of a yarn in which one ply is cotton, the other wool. The cotton is mainly tawny colored, but varies from white to light brown. The wool is undyed, mainly yellowish in color, irregularly mixed with brown.

Speaking generally, when one is creating a fine, evenly constructed tapestry, a smooth warp yarn of uniform diameter is preferred for it permits the weft to be beaten together easily and regularly. If there is a choice of wool versus cotton, a better yarn for the purpose can be made from cotton. Judging from the carefully made cotton warp yarns used in many of the finer Peruvian tapestries, the weavers seem to have been fully aware of these qualities. In the case of the Glassell shirt, the fact that only part of the warp was of cotton suggests that the weaving was done in the highlands where cotton, when available, was a trade item. If this is a correct deduction, the weaver of this shirt lacked enough cotton for the complete project so substituted wool spun and plied to match the size of the cotton yarn. Had the weaving been done on the coast, where cotton was the common fiber, there would have been no technical reason for not having all the warp of cotton.

In attempting to deduce how the two halves were made, we must start with the technical details. The edges which are joined and covered by lacing stitches down the center of the shirt prove to be warp end selvages. Warp selvages are present on both ends of most ancient, and many modern, native American fabrics and result from the use of continuous warp yarns which turn about yarn or cord headings lashed against the loom bars or which turn alternately about a single common cord in another warping system. The weft is laid or beaten in against the heading which

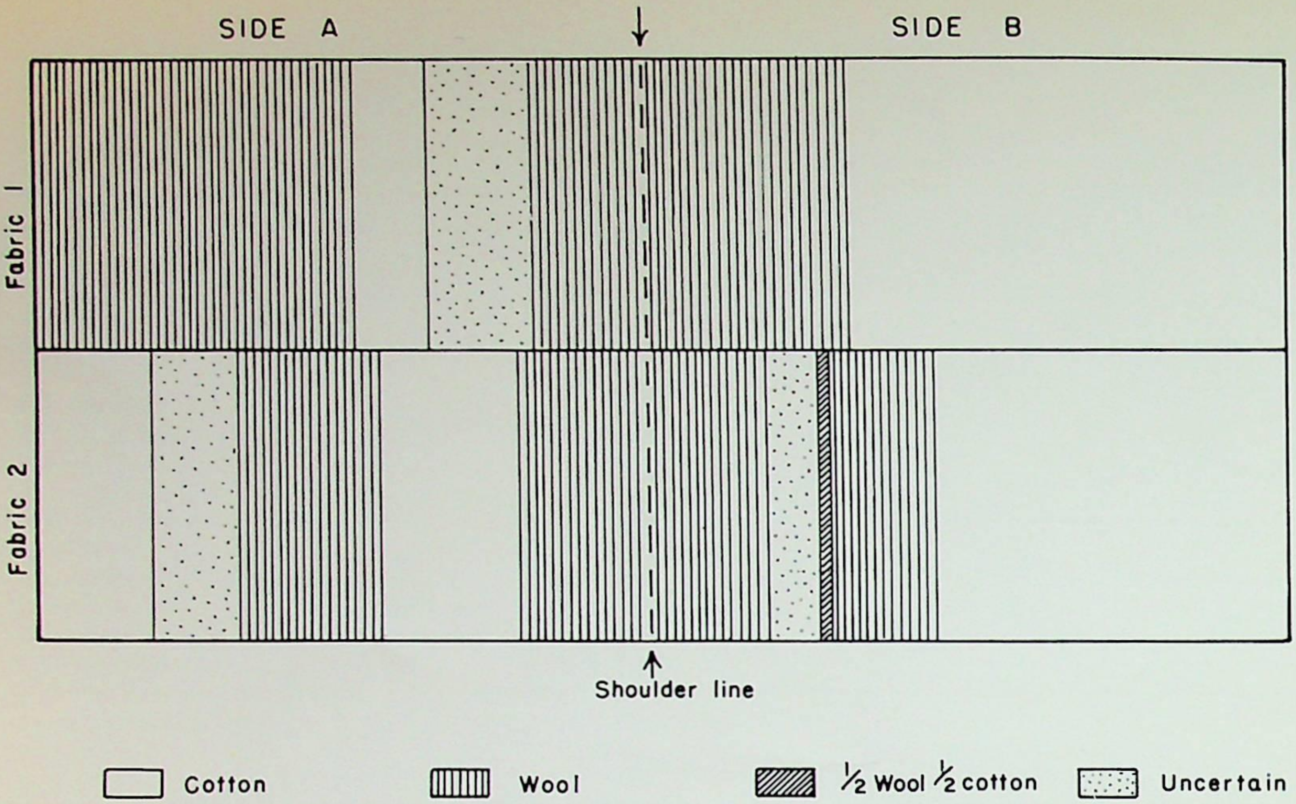


Fig. 3 Diagram of the two fabrics as seamed together showing the apparent distribution of cotton and wool in the warp yarns.

may or may not be withdrawn on completion of the work. In this case, the headings are still in place at one end of each piece and consist of a single pick or passage of two strands of two-ply wool yarn, loosely doubled together. As the heading yarn is not much heavier than the warp, it does not create a noticeable rib or bulge.

The opposite edges of the fabrics, now forming the sides of the shirt, are seamed with the same stitch as used at the center. The arm openings, like the neck slit, are bound with whipping stitches. Where a few of these are loosened by wear at the shoulders, one can see that there is no heading yarn. Instead, a finished edge was created by cutting the warps one at a time after the weaving was finished, then successively interweaving them diagonally with the four adjacent warps as shown in Fig. 4. If our identification of the working face of the tapestry is correct, the construction of the edge finish of fabric 1 started at the weaver's right and terminated at the left. The edging of the other fabric ends is hidden by the stitching. When completed, the excess warp was cut off close to the fabric so neatly that one can understand what was done only by viewing it under magnification. The advantage of such an edge finish is that the heddle and shed rod controls of the warp could function until the tapestry weaving was completed. Also, none of the final weft insertion had to be done with needles as would have been the case had the pattern been carried the full length of the warp and a warp selvage created. The strip of diagonally interwoven warp achieved the same purpose and prevented any loosening of the weft. The only disadvantage to the thrifty Peruvian weavers, beyond the work involved, was that some warp yarn was wasted even though this was probably no more than a few inches off each warp.

We cannot be certain of the details of the loom used. We know that the loom bars had to be long enough to accomodate the fabric widths of over 83 inches (211 cm.). We know also that the warp was secured to one bar, if not both, by a spiralled lashing about both the bar and the heading yarn. The opposite bar, if not lashed to a heading cord, might have been in the warp end loops. Both bars, we suspect, were tied to two poles to form a rectangular frame used in an upright or near vertical position. Conceivably, the warp might have been long enough to suffice for both fabrics as in Fig. 5A. If so, when one fabric was completed the relative position of shed rod and heddle would be reversed, the frame inverted, and work on the second fabric started against the opposite end of the warp. The fact that one fabric is slightly longer than the other on the warp end selvage would not argue against this procedure. The difference could result from a slight, unintentional fanning of the warp between the bars. The alternative would be to set up shorter warps on two frame looms or on the same bars if the pieces were woven in succession. Fig. 5B.

There are two obvious ways to determine which system was used. One is to count all warps in both pieces. The second is to check differences in the warps to see if they are identical in both fabrics. Both checks were made and both confirm that the warp in each piece was separately set up.

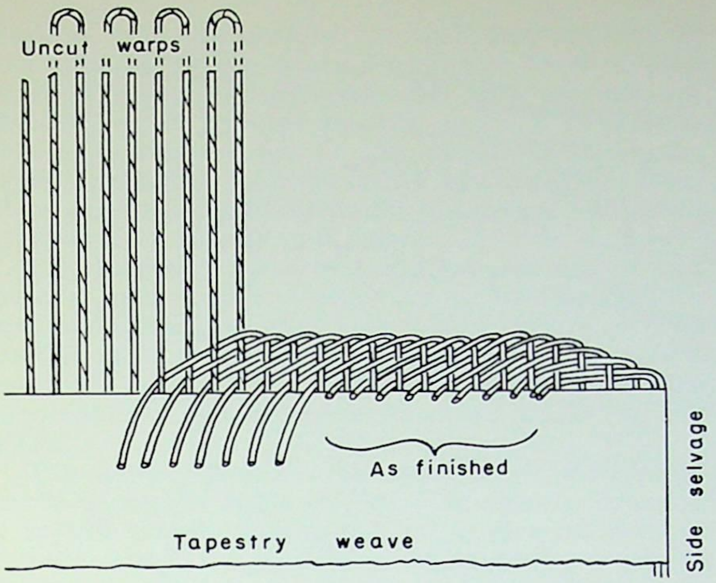


Fig. 4 Diagram of the warp edge finish created by successive cutting and interweaving of warp ends. When compacted, the result is a strong edge which prevents any ravelling or slipping of the weft.

In fabric 1, measuring 83.3 inches (212.8 cm.) in loom width near the warp selvage, there are a total of 2219 warps as counted in the monochrome area bordering the pattern. Fabric 2, 83.25 inches (211.5 cm.) in loom width, has 2243 warps in the same unpatterned section. The counts were made using a low power binocular microscope. Every hundredth warp was marked with a thread for rechecking and the number of warps involved in each adjacent pattern unit was recorded. In a single fabric, woven on looms equipped with string heddles and shed rod, one may find some slight difference in warp counts due to breakage of warp yarns or the accidental exclusion of others during weft insertion. One instance of the latter was encountered in this shirt where two adjacent warps involved were not interwoven for several inches. After the weaver noted this, they were incorporated in the weave and the unwoven section of warp cut off, the ends of the yarns showing on the inner side of the shirt. The average warp counts are: in fabric 1, 26 per inch and 26.5 per inch in fabric 2. Perhaps more revealing than the average warp count are the variations encountered. In fabric 1 the space occupied by 100 warps varies from 3.40 to 4.22 inches (8.6 to 10.7 cm.). In fabric 2 the range is 3.36 to 4.15 inches (8.5 to 10.5 cm.).

The number of warps in each of the twenty rows of the pattern rectangles varies from 94 to 122 in fabric 1 and from 94 to 118 in fabric 2. In both fabrics there is noticeable variation in the spans of those sets of warp which form the horizontal divisions of the rectangular design units as they are oriented in the shirt. It is clear that the weaver has neither measured these spaces carefully nor counted the number of warps when planning the work. Obviously, the weaver did not consider it important to duplicate exactly the spaces allotted to the motifs and was content to align the pattern units visually in the two fabrics.

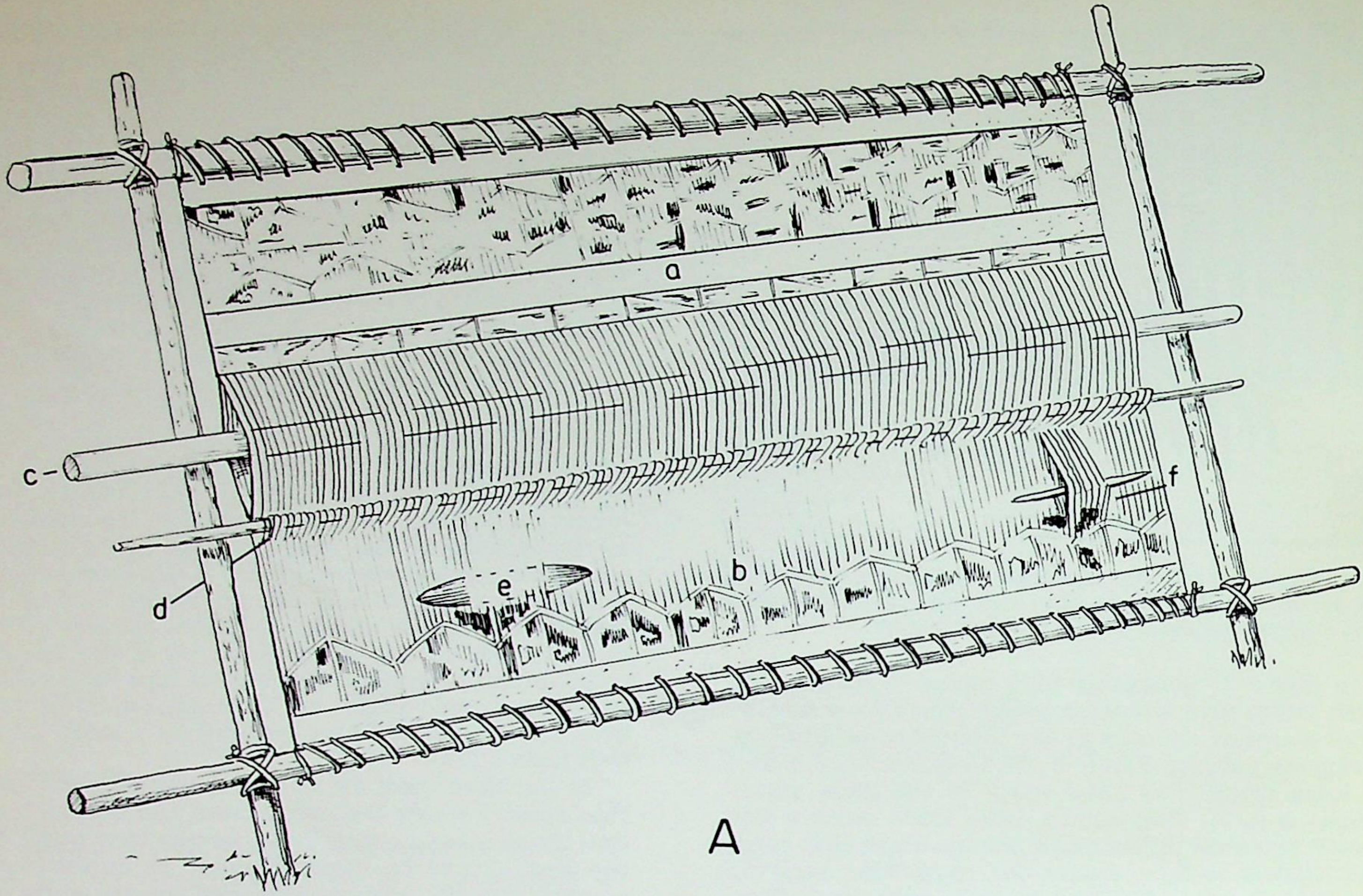
The fact that both cotton and wool were used for the warp has already been mentioned. A complete and accurate check is difficult because the yarns are hidden by the compact weft and the stitching of seams and edges. One must seek with a microscope for minute openings where the fibers are, or can be, exposed without damage. While all the warps were not seen, enough were plotted to show that less than half are of cotton. Fig. 3. Curiously, this fiber is distributed in approximately the same irregular fashion in both fabrics but with enough differences to show that they were warped up and woven separately.

In the sketches of the alternative procedures for creating the two fabrics, the frame looms, Fig. 5, are shown equipped with heddle and shed rods. This was done only because such rods are normal parts of most archaeological and modern native looms in Peru, not because of any internal evidence in the fabrics. Such looms are, however, all much narrower, the maximum widths related to the working span of the weavers' hands. For wider products, such as the shirt sections, at least two operators would be needed to raise the heddle. If the weft yarn passed from one side selvage to the other in the plain bands, or if the tapestry construction required a continuous shed from selvage to selvage, than a heddle of this length would be practical and its use could be deduced by a study of the weft movements.

In the shirt there are only very limited portions of the tapestry where the colors meet and interlock and can travel in succession from selvage to selvage. For the rest, wherever diagonal color junctures occur, especially in the portions bounded by the white, zigzag separation lines, construction in one area was independent of the corresponding areas. This accounts for the variations in the proportions of the repeated pattern details and the varying number of weft passages in them and suggests that the warp movements in one area were independent of those in another. What we observe could be duplicated, although inefficiently, by using a rigid heddle rod. More effective would have been the use of a heddle made only of cord or yarn such as is still used by some people in South America. These flexible heddles permit the weaver to raise any portion of the warp independently of the rest but will not automatically open the entire shed. As some warps are lifted the beater is slipped into place to hold the separation of those warps the weaver is concerned with. The beaters or battening swords can be of any length the weaver finds convenient and are usually considerably shorter than the loom width.

A less reasonable alternative deduction on how the weavers of the shirt controlled warp movements is that they might have had several rods attached to the heddle lacing, these to be raised independently of each other. This is a theoretical solution only, without any known examples, so at this time the evidence, the minutiae of weft movements in the fabrics, favors the flexible heddle.

In addition to the technical details of construction, we should note that as the weavers created the colorful tapestry panels, the motifs were oriented at ninety



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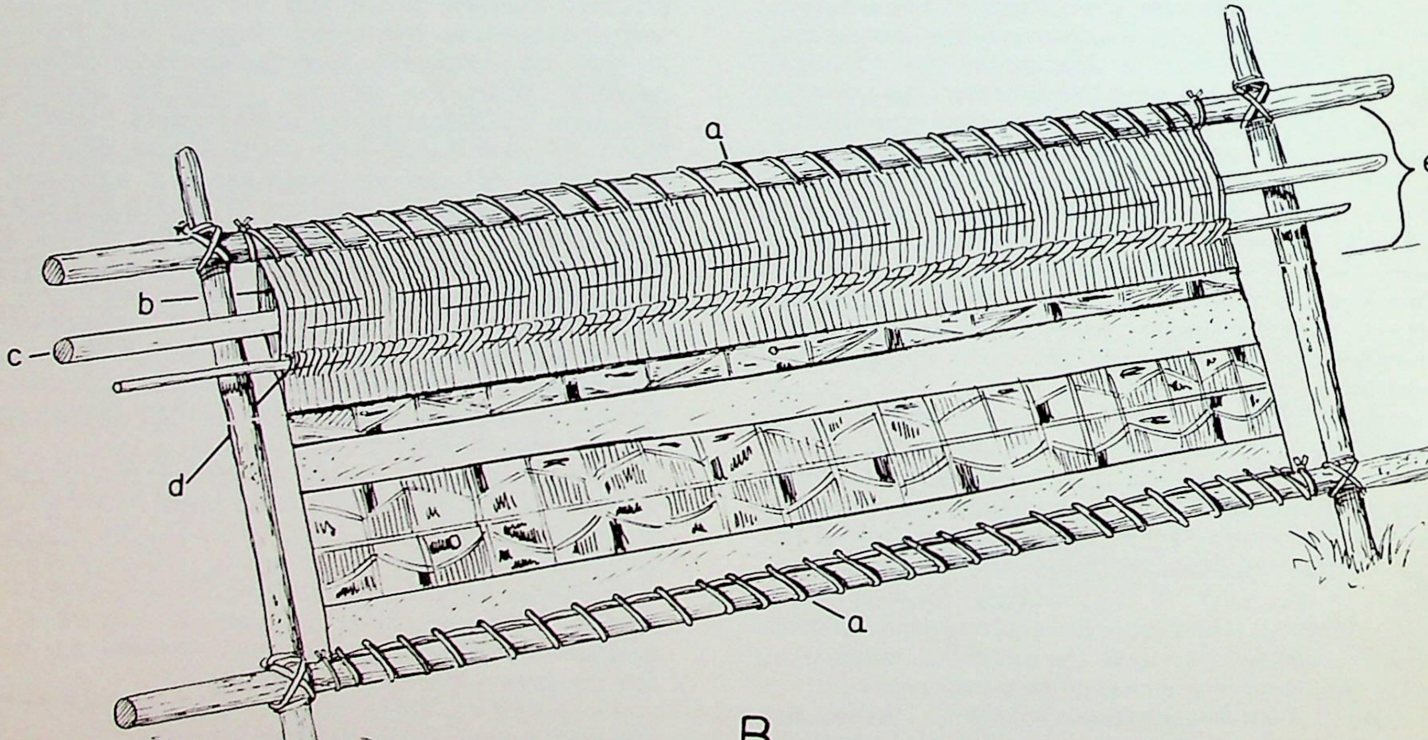

B

degrees from the position in which they are seen on the shirt as it was worn. We do not know if they worked from a mental image, composing as work progressed, or if another finished tapestry or needleworked sampler served as a guide. If the latter, the work could have been done by any skilled weavers, their personal contribution to the design limited to choice and distribution of colors.

The theme consists of the combined use of two motifs: a stepped fret which is a stepped block with appended scroll or hook, alternating with a stylized profile face, each repeated in four different combinations of position and orientation and with combinations of nine colors in addition to white and black.

The stepped fret was the most widely distributed motif in ancient American art. One version occurs on a spindle whorl found at Grand Coulee on the Columbia River; the southernmost examples are from central Chile. Some from Peru and Mexico were made several centuries B.C. and crude versions still persist in the modern weavings of those countries. Such antiquity and wide-spread use suggest that it may have had significance and meaning as a symbol. What this may have been, or if it was similarly regarded throughout its range, is something long since forgotten. Those who have ascribed meanings to it in modern times have done so from their imagination. Whatever the facts, it was popular at the time this shirt was created and was repeated in varied renditions in all media utilized by the artists and craftsmen of that time. Endless repetition of the stepped-fret, like that of the geometric eight-pointed star motif which was distributed from Spain to eastern Asia long before it appeared in America, creates the impression that such motifs became almost an obsession with the weavers and artists. We suspect that the great numbers of examples of both motifs, their widespread and long use by unrelated peoples, is not so much proof of shared traditions as it is evidence of the human tendency to copy rather than to innovate. In the shirt, the stepped-fret motif is repeated one hundred and twenty times, it is varied by inversion and alternate reversal and it is submerged within the framework of the pattern by color combinations and equal sharing of space with the stylized profile face. For those unfamiliar with Huari art, the face may not be easily recognized. Its most conspicuous detail is the eye with a pronounced mark or pendant below it sometimes, but not convincingly, referred to as a tear line or tear mask. More readily recognized is the fanged mouth, with the white outline of the two fangs forming the letter N in some and a reversed N in others. The depiction of fangs in Middle Horizon art, found in some of their anthropomorphic, mythological figures and in these heads, may well be a survival of the feline attributes so frequent in the Chavin art and the mythology of Peru a thousand or more years earlier. In this case, or perhaps one should say by the time this shirt was made, the treatment of the fangs was casual. Fifty-one of the one hundred and twenty depictions are incorrect and show the lower jaw fang behind the upper instead of in front as they actually are in cats.

Another feature of the design plan which merits comment is the alternating expansion and compression of the motifs in their lateral dimensions. At first one may think that there has been casual planning, that the varied lateral proportions are an accident. Far from an accident, this was deliberate, a peculiarity of Huari textile art. In other examples, the expansion and contraction is restricted to portions of the motif. Where a complex subject so depicted is shown in alternating positions, it is difficult for untrained eyes to recognize what they see. The exaggerated parts, occupying the greatest space, draw one's attention and tend to camouflage the rest.* Here, throughout, the complete motifs are rendered either in wide or narrower versions and in no case is the distortion restricted to portions or sections of them. This holds even in the narrow renditions bounding the sides of the shirt.

These borders, the last section woven, give the impression that there was not sufficient space left on the warps and that the pattern had to be crowded in. This was not the case. Similar narrow borders are repeated on other Huari tapestry shirts as a normal part of their plan. Conceivably, the inspiration for them may have arisen from a case of poor planning, solved in a way that proved appealing. In turn, this could have led to the distortion of parts of the figures, and distortion became the thing to do. If so, it is a reasonable assumption that the artist who started it all was working in the tapestry technique, perhaps on a wide loom, while creating a shirt like the Glassell example.

*A detailed description of this intriguing design concept entitled "Tiahuanaco Tapestry Design" was prepared by Alan R. Sawyer and was published simultaneously as special paper Number Three of the Museum of Primitive Art and in the *Textime Museum Journal*, Volume 1, Number 2, December 1963.

The black and white photograph of the Middle Horizon Tapestry Shirt (Fig. 1) and the drawings of the diagrams (Fig. 2, 3, 4 and 5) are courtesy of the American Museum of Natural History, New York City. The color photograph for the cover is courtesy of Mr. Alfred C. Glassell, Jr., Houston, Texas.

Fig. 5 Alternative ways by which the two fabrics of the Glassell shirt could have been woven. Technical details rule out the A system where the two fabrics share the same warp and one heddle. In both diagrams the amount of unwoven warp is exaggerated.

A: a, Textile 1, weaving completed; b, Textile 2, weaving in progress; c, shed rod; d, heddle with rod; e, f, beaters inserted in warp where weavers are working with one turned on edge to open shed for weft insertion.

B: a, lashings about warp end headings; b, the warp separation or shed maintained by the shed rod; c, shed rod; d, heddle; e, residual, unwoven warp.